United States Department of Agriculture | Forest Service | Arizona Zone Entomology & Pathology | 2500 S. Pineknoll Drive Flagstaff, AZ 86001

File Code: 3400

Date: June 3, 1997

Dave Reinhold
Forest Manager
Bureau of Indian Affairs
Fort Apache Agency
PO Box 560
Whiteriver, AZ 85941

As requested, this letter documents recommendations for silvicultural treatments designed to evaluate effects of thinning on branch dieback caused by Prescott scale, Matsucoccus vexillorum, on ponderosa pine on the reservation.

The purpose of silvicultural treatment is to minimize effects of scale feeding by improving individual tree vigor. While increased spacing may also have the benefit of reducing potential for spread that is not the main goal of treatment. The principal goal is to improve health so that the trees may better withstand presence of the scale, therefore suffering less branch dieback. There are no published studies to substantiate the effectiveness of thinning, however the data from our prior survey suggest that density may play a role in the incidence of branch dieback. We think the best treatment for scale in the long run will be to increase the growing potential in the affected stands; thinning will have other benefits as well including reducing susceptibility to bark beetle attack. From a broader perspective, I think the latter is a larger forest health concern within pine forests on the reservation.

In the 1992 survey (see our letter dated October 1, 1993), data from plots with and without branch dieback strongly suggest that higher density may play a role in predisposing trees to increased branch dieback (Table 1). The number of trees per acre in the plots with branch dieback was over twice that present on the symptomless plots. Similarly the average basal area (square feet per acre) was also greater on the plots with branch dieback vs those without. Perhaps the most telling results though were the SDI (stand density index) levels. The average value (for trees 5 inches in diameter and greater) for those plots with dieback was 258 which is 57 percent of maximum SDI for ponderosa pine. This is very close to 60 percent of maximum which is the point for ponderosa pine where density related mortality begins. On the other hand the average value for the symptomless plots was 161 which is around 36 percent of maximum.

Table 1

Average Conditions for Plots With and Without Branch Dieback[1]
Based on Survey data collected in July-August 1992

Plot Condition	TPA	BA	SDI
Dieback Present	267	147	258
Dieback absent	115	106	161

[1] Number of plots with branch dieback = 32 out of 54
Number of plots without = 22 of 54

With these data in mind, we would suggest establishing demonstration plots in and around the affected areas that would contain a range of conditions, from perhaps 80 square feet up to current density levels (controls) in order to test the effectiveness of thinning as a treatment. One suggestion would be to establish plot clusters with one plot thinned to 80 square feet, the second to 100 square feet, and the third a control. Several such clusters could be established with the affected area. Plot size would need to be determined. Similar studies looking at relationships between thinning and bark beetles have utilized 2.5 acre plots. In the thinned plots, trees would be favored that have less dieback. In the affected area, that will tend to favor trees smaller than 6 inches in diameter and larger than 14 inches. We devised a rating system to measure dieback (table 2), that could be used as a marking guide.

Table 2

Scale Rating	Percent Canopy Affected
0	0
1	1-25
2	26-50
3	51-75
4	76-100

This rating is a whole tree rating based on a visual estimate of the percent of the canopy affected by dieback. A possible marking guide might include marking all trees with 3 and 4 ratings. This guide may need to be flexible in order to reach desired basal area goals for each treatment. Trees would be rated prior to treatment and tagged so that they could be monitored over time.

We would be interested in assisting with this project, feel free to contact us if you have any questions (520) 556-2074.

JILL L. WILSON
Entomologist
Arizona Zone Entomology and Pathology

cc:
For:r03a
M.Larson:r03a
NMZ
D.Parker:r03a
M.Frank
M.Williams, Fort Apache Agency
D.Bierer, Tribal Forestry